

PROCEEDING



THE THIRD INTERNATIONAL SEMINAR ON ANIMAL INDUSTRY

“Sustainable Animal Production for Better Human Welfare and Environment”

September, 17-18 2015

IPB International Convention Center

Bogor-Indonesia



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BOGOR AGRICULTURAL UNIVERSITY
2015**

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**Proceeding of the 3rd International Seminar on Animal Industry,
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The Diversity and Quality of Forages Used for Feeding of Goat in Payakumbuh of West Sumatra

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Abstract

The present research was aimed to evaluate the diversity and quality of forages used for feeding of dairy goats in Payakumbuh regions of West Sumatra. Sample of forages were taken in 3 different sampling times from 8 goat farms. The fresh samples from 5 different sampling points at each farm were weighed and then sorted by plant species for identification of botanical composition. Seven highest percentages of individual plant and a mixture of other plants were chopped, dried and ground for chemical analysis. Parameter measured included botanical composition, DM and nutrient content of CP, CF, crude ash and minerals of Ca, P, Fe, Cu, Mn and Zn. Results showed that there were about 47 kinds of vegetation used for feeding for goats in Payakumbuh. They were composed of 40% of native grasses, 34% of broadleaves, 19% of legumes, and 6% tree leaves, respectively. The seven highest portion of forages was Axonopus sp, followed by Panicum sp, ferns, Centro sp, gamal and cassava leaves. Legumes and tree leaves were found containing lower CF and higher CP and essential minerals of Ca, P, Fe, Cu, Mn and Zn in compare to grasses and broadleaves. It was concluded that there were diversity forages resources available for feeding of goats in Payakumbuh regions, but the nutritious green fodders of legumes and tree leaves were still used in limited portion.

Keywords: dairy goat nutrition, minerals, wild forages

Introduction

Payakumbuh which cover Payakumbuh city and 50 Kota district is one of the areas of potential for development of goat farming in West Sumatra. Goat farms are dominated by small-scale enterprises which the major breeds are the Kacang and Etawah grade (PE) goats. They are distributed mainly in six sub districts of Lareh Sago Halaban, Harau, Mungka, Luhak, East Payakumbuh and West Payakumbuh. Khalil and Reswati (2014) reported that raising dairy goat has better prospect in compare to meat-type due to potential market for goat's milk and higher price of bucks in Payakumbuh. The average flock size of about 35.9 of dairy goat/farm was much higher in compare to meat-type breeds of 14.3 goats/farm (Khalil and Reswati, 2014).

Dairy goats are raised intensively with cut and carry feeding system. The feeding is based primarily on the use of native vegetation, tree leaves and agricultural by-products. The wild vegetation forages are derived from diverse sources, like plantation areas, river banks, rice fields, forest edges and road sides. Vegetation grown in such areas are considered as weeds, not treated and comprise of various types of wild plants, such as native grass, legumes, broadleaf species and ferns. These feed were not only vary in nutrient content, but also are often of poor mineral and DM (Khalil *et al.*, 2014). Thus, determining the botanical composition and nutrient content of dominant species may be useful for improvement of feeding strategy.

The present research was aimed to evaluate forage resources that are available in terms of the species, botanical composition and quality used for feeding of goats by small-scale enterprises in Payakumbuh regions of West Sumatra.

Materials and Methods

The study was initiated by collecting samples of forages from 8 goat farms located in Payakumbuh city and 50 Kota district. The farms have about 24 goats/farm in average. They were distributed in 7 different sub districts of East Payakumbuh, West Payakumbuh, Lareh Sago Halaban, Luhak, Arau, Akabiluru and Tanjung Aro. These areas are dominated by annually small-scale crop estates as potential sources of green fodder.

Samples of feed in fresh form were taken in 3 different sampling times from 5 different sampling points at each farm. The fresh samples were weighed and then sorted by plant species for identification of botanical composition. Seven highest percentages and most frequent species were selected and chopped. Representative samples of about 100-150 g were dried in a forced draught oven at 60 °C for 24 hours and ground in meal form prior to analysis for dry matter (DM), crude ash, crude protein (CP), crude fiber (CF) and minerals of Ca and P.

DM and nutrient contents of crude ash, CP and CF were determined using the procedure described by AOAC (2005). The concentration of minerals was determined using an atomic absorption spectrophotometer (AAS, 1980). All analysis results were reported on DM basis. Parameter measured included botanical composition, DM and nutrient content of CP, CF, crude ash and minerals of Ca and P. Data on nutrient and mineral content were subjected to analysis of variance (ANOVA) in completely random design of 7x3 consisting of 7 forage species and 3 replicates. Duncan's Multiple Range (DMRT) was applied to separate means. Differences were considered significant at $P < 0.05$ (Steel *et al.*, 1997).

Results and Discussion

Results showed that there were about 47 plant species used for feeding of goats in the study sites. They were composed of about 40% of grasses, 34% of broadleaves, 19% of legumes and 6% tree leaves, respectively. It shows that there were diversity kinds of fodder available for feeding of goats in Payakumbuh. Goats have the unique ability and the tendency to utilize wide diversity of plants species such as woody plant species, forbs and grasses which are not generally consumed by other domestic livestock (Hart, 2001). Therefore, goats were favorable alternative and suitable incorporated for small-scale farmer or part-time livestock producer in Payakumbuh. This data also shows that farmers in Payakumbuh were able to explore the potential of various forage sources for feeding of their goats.

Grasses were dominated by native species of *Axonopus compressus*, *Panicum repens*, *Paspalum conjugatum*, *Ottlochloa nodosa*, *Brachiraria milliformis*, *Brachiaria mutica*, *Ischaenum mucunoides*. *Axonopus* sp which composed of about 23% was found the most important grass species, followed by *Panicum* sp (5.3%) and *Paspalum* sp of 4.0%. *Axonopus* and *Paspalum* which are known as high palatable and shade tolerant species was commonly found growing as weeds under rubber and palm crop plantations (Wong, 1990), while *Panicum* was widely found in the area of banana, and coconut plantations. Sub district of Lareh Sago Halaban, Harau, Mungka, Luhak, East Payakumbuh and West Payakumbuh are dominated by annually small-scale crop estates of cacao, coconut and banana.

The two most important legumes were *Centrosema pubescens* and *Desmodium* sp. Broadleaves were dominated by *Amaranthus* sp, *Borreria alata* and *Miknia cordata*. There were two potential leaves available in Payakumbuh, i.e. gliricidia and cassava leaves. *Gliricidia sepium* is commonly used as live fences, while cassava is widely planted to produce cassava roots for making snack foods. In Nigeria, important plant families that contribute to the most preferred forage resource base of goats include tree and shrub legumes, which formed 15.80% of which families Fabaceae (Papilionaceae), Caesalpinadeae and Mimosaceae comprised 2.63%, 2.63% and 10.53% respectively (Obua, 2014).

Table 1 shows DM, crude nutrient and mineral content of seven dominant plant species fed for goats in Payakumbuh. The nutritive values of dominant plant species used for feeding goat in Payakumbuh were found relatively high. The crude protein content of native grasses ranges from 11.3 to 13.1 %, while legumes from 17-23%. Legumes and tree leaves were found containing lower CF and higher CP in compare to grasses. Legumes contained also relatively high P of about 11-13 g/kg DM. The content of crude protein and minerals of Ca and P of fern was found equal to native grasses. The highest CP of about 28-27% and lowest CF content (13-21%) was shown by tree foliage of gliricidia and cassava leaf. Fodder leaves were also found as good mineral Ca sources with significantly highest Ca content of about 15-20 g/kg DM. Tree foliage which composed of young leaves, stalks, seeds and floral parts of the vegetation components have a high nutritional value (Handayanta *et al.*, 2014). Ajayi *et al.* (2005) reported that gliricidia foliage was a good protein sources for goats and had a crude potent content of 29.3%. High concentration of Ca in cassava leaf has also been reported by Fasuyi (2005). Adiwimarta *et al.* (2014) reported that cassava leaf was not only a good protein sources but also had an anthelmintic effect for goats.

Table 1. Crude nutrient and mineral content of forages fed for goat in Payakumbuh

Plant species	DM (%)	CP (%)	CF (%)	Ca (g/kg)	P (g/kg)
Axonopus	23.9±0.2 ^{ab}	11.3±0.3 ^c	35.3±3.5 ^a	2.1±0.3 ^d	8.1±0.7
Panicum	22.7±0.6 ^{ab}	13.1±0.2 ^c	37.4±1.9 ^a	2.2±0.1 ^d	5.8±1.1
Centrosema	17.1±0.2 ^b	17.2±1.4 ^b	29.2±2.6 ^b	3.5±0.5 ^d	12.6±0.5
Desmodium	14.6±0.1 ^b	23.2±0.3 ^a	25.6±3.2 ^b	8.2±1.7 ^c	11.3±2.4
Gliricidia leaves	24.9±0.2 ^{ab}	26.8±1.0 ^a	12.7±1.2 ^d	20.1±1.9 ^a	7.4±0.9
Cassava leaves	28.5±1.0 ^a	25.3±1.7 ^a	21.1±1.6 ^c	15.0±0.4 ^b	11.4±0.9
Fern	27.2±0.6 ^a	11.2±0.6 ^c	28.7±0.5 ^b	2.8±0.3 ^d	7.2±1.9

Different superscript in the same line means significantly different (P<0.05)

Even though native grasses have slightly lower crude protein and mineral and higher CF content, their combinations with legumes and tree leaves which contain high crude proteins and minerals make them good forages. Due to their high nutritional content, the use of fodder from tree leaves should be increased in the feeding of goats. Because of relatively good fodder feeds, the average milk production of about 0.8 l/head/day in Payakumbuh (Kurnia *et al.*, 2015) was comparable the results reported by Novita *et al.* (2006), where lactation milk yield was 0.5-0.9 liters per day.

However, farmers should give attention on the daily quantity of forages offered to meet DM and nutrient requirement of their livestock due to relatively low DM content of the forages of about 22%. The average DM content of legumes of 14-17% was significantly lower in compare to grasses (23-24%) and tree leaves (25-29%).

Conclusion

It was concluded that there is wide variety of plant species utilized as green fodder feed for goats in Payakumbuh. The forages offered mainly composed of native grasses, broadleaves, legumes and tree leaves. Legumes and tree leaves generally contained higher CP and minerals in compare to grasses and fern. Due to low in dry matter content of the most dominant species, it was therefore necessary to take into account the quantity of fresh forages for feeding goats under confinement to meet their nutrient and dry matter needs.

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